Butll. Inst. Cat. Hist. Nat., 54 (Sec. Bot., 6): 31-35. 1987

AEGERITELLA SUPERFICIALIS **BAŁ. ET WIŚ. AND** A. TUBERCULATA **BAŁ. ET WIŚ. (DEUTEROMYCETES), EPIZOIC FUNGI ON TWO** FORMICA **(HYMENOPTERA: FORMICIDAE) SPECIES IN THE IBERIAN PENINSULA**

Rebut: juliol 1986

Xavier Espadaler * i Jerzy Wisniewski **

RESUM

Aegeritella superficialis **Bał. et Wiś.** i A. tuberculata **Bał. et Wiś.** (Deuteromycetes), **fongs epizoics de dues espècies de** Formica (Hymenoptera: Formicidae) **de la península Ibèrica.**

Aegeritella superficialis Bał. et Wiś. i **A. tuberculata** Bał. et Wiś., fongs epizoics, s'han trobat en dues espècies de formigues, **Formica decipiens** Bondr. i **F. pressilabris** Nyl., respectivament. Ambdues formigues són hostes nous per als fongs, i aquests representen dues noves addicions a la micoflora ibèrica. Els bulbils abunden més cap a la part distal del cos de les formigues (gàster, tercer parell de potes), el que suggereix un paper actiu, per autocondícia i allocondícia, de les formigues en la distribució del fong en el seu cos.

SUMMARY

Aegeritella superficialis Bał. et Wiś. and **A. tuberculata** Bał. et Wiś., epizoic fungi on **Formica decipiens** Bondr. and **F. pressilabris** Nyl., are new records for the Iberian Peninsula; both ant species are new hosts for the fungi. Bulbils are more abundant at the rear of the body suggesting that ants partially control the spread of the fungus over its body by auto and allogrooming.

The genus *Aegeritella* and the species *A. superficialis* were erected by Bałazy and Wiśniewski (1974) to describe an epizoic fungus found on several species of *Formica* ants in Poland; a second species, *A. lenkoi*, was described from a Brazilian *Camponotus sericeiventris* (Guérin) (Bałazy & Wiśniewski, 1977), a third one, *A. tuberculata*, from *Lasius flavus* (Fab.) and *Formica fusca* L. also from Poland, and very recently (Bałazy *et al.*, 1986), a fourth one, *A. roussillonensis* on *Cataglyphis cursor* (Fonscolombe) in Southern France.

* Departament de Biologia Animal, Biologia Vegetal i Ecologia. Laboratori de Zoologia. Facultat de Ciències. Universitat Autònoma. 08193 Bellaterra. Barcelona. Spain.
** Forest and Environment Protection. Academy of Agriculture. Ul. Wojska Polskiego 71 C. 60-625 Poznan. Poland.

TABLE I. Present knowledge of *Aegeritella* species with its hosts and country where found. (Reference in brackets.)
Estat actual del coneixement de les espècies d'*Aegeritella*, amb els hostes i país. (Referència entre parèntesi.)

	A. superficialis	*A. lenkoi*	*A. tuberculata*	*A. roussillonensis*
Formica rufa L.	Poland (2, 9, 12) Switzerland (6)			
F. polyctena Först.	Poland (2, 9, 12) Switzerland (6) Federal Rep. Germany (11)			
F. pratensis Retz.	Poland (2, 9, 12)			
F. truncorum Fabr.	Poland (2, 9, 12)			
F. lugubris Zett.	Italy (10) Switzerland (6)			
F. sanguinea Latr.	Switzerland (6) Poland (12)			
F. fusca L.	Poland (2)		Poland (4)	
F. decipiens Bondr.	Spain			
F. pressilabris Nyl.			Spain	
Lasius flavus (Fab.)			Poland (4)	
Camponotus sericeiventris (Guérin)		Brazil (3)		
Cataglyphis cursor (Fonscolombe)				France (1)

Here we report the presence of *A. superficialis* and *A. tuberculata* on two species of *Formica*; the present knowledge of geographical and host distribution is summarized in table I. Until now only members of the subfamily Formicinae are known as hosts to *Aegeritella* species. The new Iberian localities are the following:

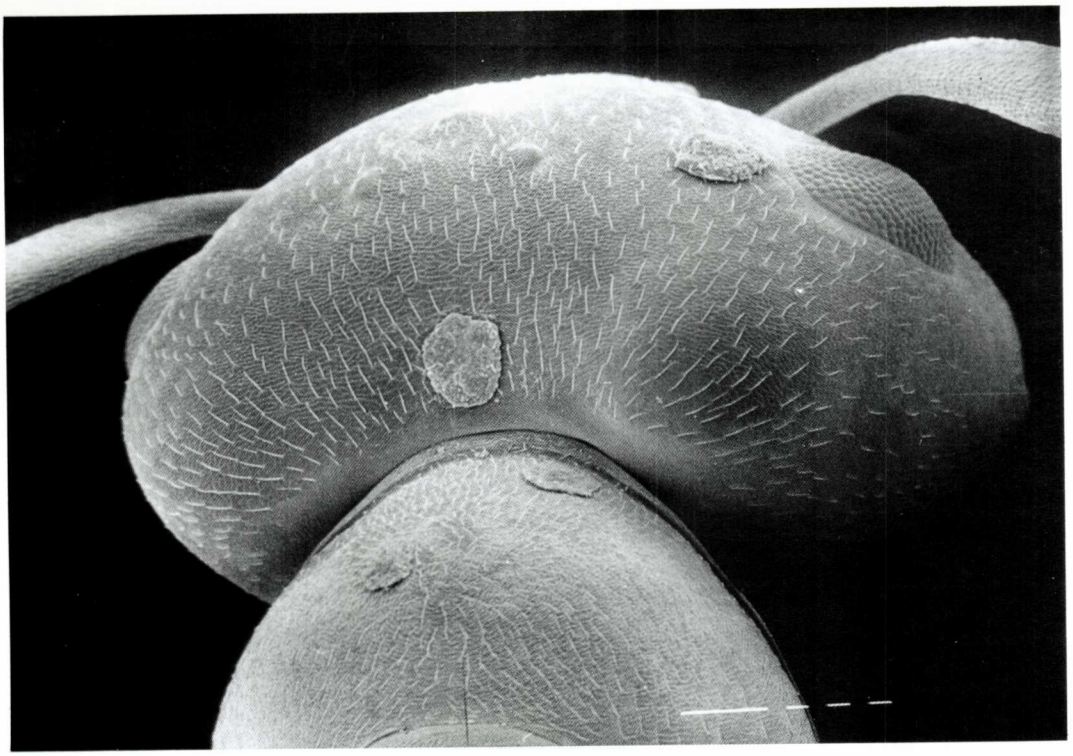
Aegeritella superficialis Bał. et Wiś. 1974. On *Formica decipiens* Bondr. La Castanya, Montseny (Barcelona), 5-VII-79. Nest under stone near a field path at 850 m; UTM 31TDG4626. Two infected workers.

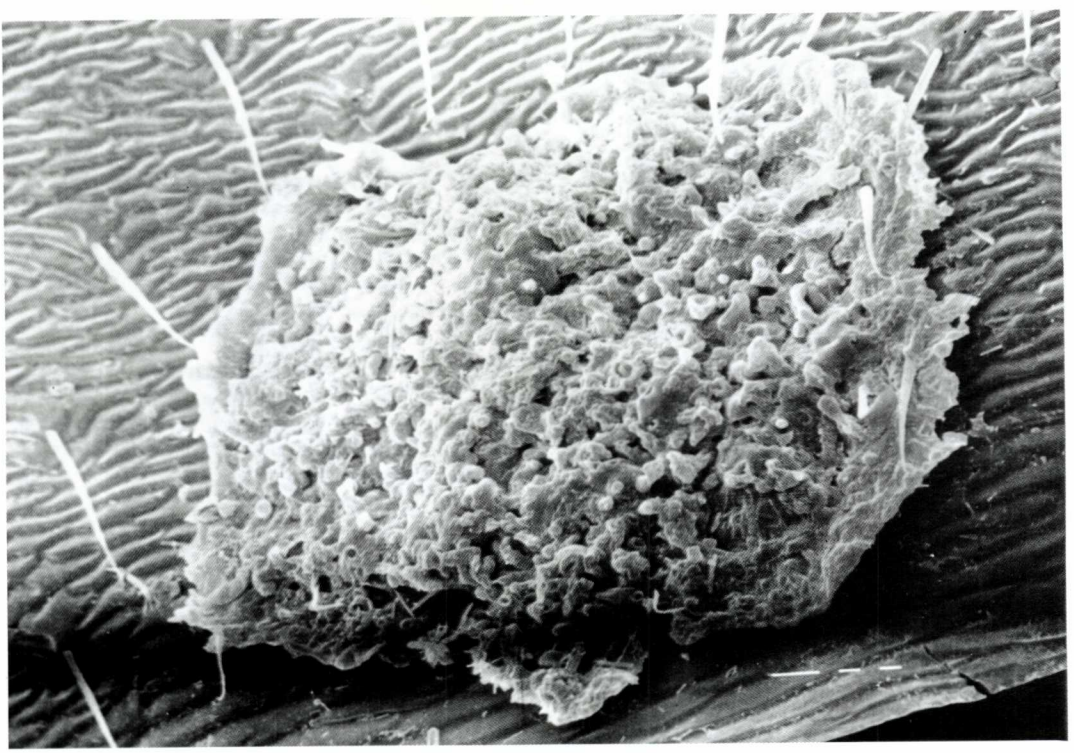
Aegeritella tuberculata Bał. et Wiś. 1982. On *Formica pressilabris* Nyl. Aiguamoix (Lleida), 8-VI-1975. Dome nest of grass litter in a meadow at 1.850 m, outside a wood of *Pinus mugo*. UTM 31TCH3025. 34 infected workers (figs. 1, 2).

Both ant species are new hosts to their respective fungi.

FIG. 1. SEM photography of bulbils (4) of *Aegeritella tuberculata* Bał. et Wiś. on *Formica pressilabris* Nyl. from Aiguamoix (Lleida, Spain).
Bulbilles (4) d'*Aegeritella tuberculata* Bał. et Wiś. damunt *Formica pressilabris* Nyl. d'Aiguamoix (Lleida, Espanya).

FIG. 2. SEM photography of a bulbil of *Aegeritella tuberculata* Bał. et Wiś. on *Formica pressilabris* Nyl.
Bulbilles d'*Aegeritella tuberculata* Bał. et Wiś. damunt *Formica pressilabris* Nyl.





There is scarce knowledge of the biology of *Aegeritella* species; spatial distribution of infected ant nests seems to be unrelated to phytosociological communities and uniform (WIŚNIEWSKI, 1976); the percentage of infected ant nests varies from 35,7 % (WIŚNIEWSKI, 1976) to 0,3 % (CHÉRIX, 1982), varying according to *Formica* species and sites. We studied 141 *Formica* samples from the Pyrenees and only 1 (0,7 %) was found to be infected; 34 out of 64 workers in the sample (53 %) of *F. pressilabris* were infected; this agrees with data from WIŚNIEWSKI & SOKOŁOWSKY (1983) for *A. superficialis* that are within the range of 1,5 to 66,6 % on infected workers in different nests of 4 *Formica* species. The number of bulbils may be as high as one hundred per worker (CHÉRIX, 1982); from the detailed study of the number and situation of bulbils in one case (table II, fig. 3) it can be seen that the gaster and legs are more heavily attacked; this agrees with previous reports of the head being the less affected portion (WIŚNIEWSKI, 1977; BAŁAZY & WIŚNIEWSKI, 1982) while the thorax is intermediate. We can find no apparent reason for this distal trend unless we assume that because of auto and allogrooming of the head —eyes, mouthparts, antennae are of vital importance— there is a lower level of infection, since it is to be expected that small, growing thalli are easier to eliminate than full grown ones. Ants would play an active, but partial, role in controlling the spread of the fungus over its bodies.

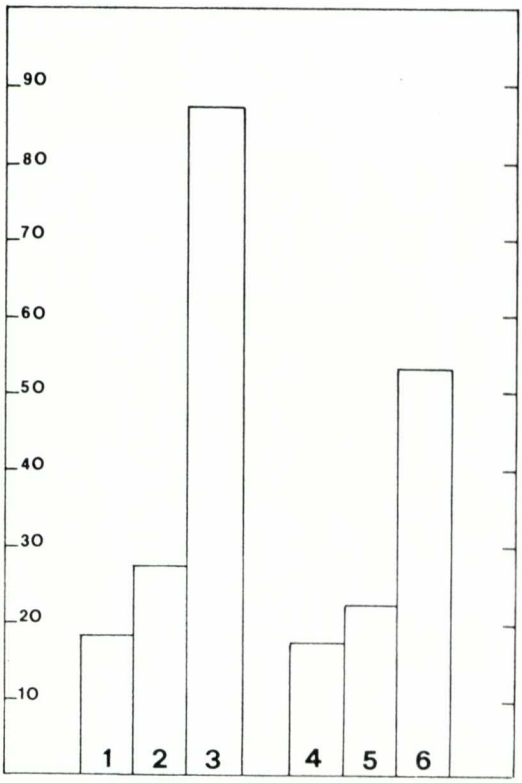


FIG. 3. Cumulative number of bulbils of *Aegeritella tuberculata* Bał. et Wiś., found on head (1), thorax (2), gaster (3), first (4), second (5) and third (6) legs in the 34 workers of *Formica pressilabris* Nyl.
Nombre acumulat de bulbilles d'*Aegeritella superficialis* Bał. et Wiś. al cap (1), tòrax (2), gàster (3), primer (4), segon (5) i tercer (6) parell de potes als 34 individus de *Formica pressilabris* Nyl.

TABLE II. Number and situation of *Aegeritella tuberculata* Bał. et Wiś. bulbils among workers (n=34) of *Formica pressilabris* Nyl. from Aiguamoix (Lleida, Spain).
Nombre i localització dels bulbilles d'*Aegeritella tuberculata* Bał. et Wiś. als individus (n=34) de *Formica pressilabris* Nyl. d'Aiguamoix (Lleida, Espanya).

	Mean number (range)	Bulbils mainly on
Head	0,5 (0-5)	back of head
Thorax	0,8 (0-4)	upper surface
Gaster	2,6 (0-13)	whole gaster
1st leg	0,5 (0-3)	femur
2nd leg	0,6 (0-3)	femur, tibia
3rd leg	1,5 (0-6)	femur, tibia
Total	6,6 (1-24)	

Since the contact of the fungus with the insect cuticle is superficial, its parasitic nature remains unclear (BAŁAZY & WIŚNIEWSKI, 1982); whichever way this last point is resolved, *Aegeritella* species seem to have successfully broken the chemical defence provided by the many glands present in ants, that have been shown to secrete antibiotic or inhibitory substances against several bacteria, fungi or even pollen (HÖLLDOBLER & ENGEL-SIEGEL, 1984; BEATTIE, 1985) and thus joining Laboulbeniales as the other major group of externally parasitic fungi on ants (TAVARES, 1985).

ACKNOWLEDGMENTS

We thank Dr. Stanislaw Balazy (Forest Research Laboratory, Polish Academy of Sciences, Poznan) for the determination of the fungi, Onofre Castell for his assistance during the SEM work and E. Descals for his botanical comments and for improving the English text. This work has been partially supported by a grant from CAICYT (1366/82).

REFERENCES

1. Bałazy, S., Lenoir, A. & Wiśniewski, J. 1986. *Aegeritella roussillonensis* n.sp. (Hyphomycetales, Blastosporae) une espèce nouvelle de champignon épizoïque sur les fourmis *Cataglyphis cursor* (Fonscolombe) (Hymenoptera, Formicidae) en France. *Cryptogamie, Mycol.*, 7: 37-45.
2. Bałazy, S. & Wiśniewski, J. 1974. *Aegeritella superficialis* gen. et sp. nov. epifityczny grzyb na mrówbach z rodzaju *Formica* L. *Pr. Kom. Nauk Rol. i Kom. Nauk Les. PTPN Poznan*, 38: 3-15.
3. Bałazy, S. & Wiśniewski, J. 1977. Record on a new species of epiphytic fungus *Aegeritella lenkoi* sp. nov. (Mycophyta, Hyphomycetales) from the Brazilian ant *Camponotus sericeiventris* (Guérin). *Acta Mycol.*, 13: 271-274.
4. Bałazy, S. & Wiśniewski, J. 1982. A new species of epizoic fungus on ants-*Aegeritella tuberculata* sp. nov. *Bull. Acad. Pol. Sci. Ser. Biol.*, 30: 85-88.
5. Beattie, A. J. 1985. *The evolutionary ecology of ant-plant mutualisms.* Cambridge University Press. Cambridge.
6. Chérix, D. 1982. Note sur la présence d'*Aegeritella superficialis* Bał. & Wiś. (Hyphomycetales, Blastosporae) sur des espèces du genre *Formica* (Hymenoptera, Formicidae) en Suisse. *Mitt. schweiz. Ent. Ges.*, 55: 337-339.
7. Höldobler, B. & Engel-Siegel, H. 1984. On the metapleural gland of ants. *Psyche*, 91: 201-224.
8. Tavares, I. 1985. *Laboulbeniales (Fungi, Ascomycetes).* Mycologia Memoir, 9. Cramer. Braunschweig.
9. Wiśniewski, J. 1976. Wystepowanie grzyba *Aegeritella superficialis* Bał. et Wiś. w Wielkopolskim Parku Narodowym. *Pr. Kom. Nauk. Roln. i Kom Nauk Lesn., PTPN Poznan*, 42: 131-135.
10. Wiśniewski, J. 1977. Occurrence of fungus *Aegeritella superficialis* Bał. & Wiś. 1974, on *Formica lugubris* Zett. in Italian Alps. *Boll. Soc. ent. Ital.*, 109: 83-84.
11. Wiśniewski, J. & Buschinger, A. 1982. *Aegeritella superficialis* Bal. et Wis. ein epizootischer Pilz bei Waldameisen in der Bundesrepublik Deutschland. *Waldhygiene*, 14: 139-140.
12. Wiśniewski, J. & Sokołowski, A. 1983. Nowe stanowiska grzybów *Aegeritella superficialis* Balazy et Wisniewski i *Erynia myrmecophaga* (Turian et Wuest) Remaudiere et Hennebert na mrówkach w Polsce. *Pr. Kom. Nauk Roln. i Kom Nauk Les. PTPN Poznan*, 56: 137-144.